

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016

PMC0075 – CALCULUS

(All sections / Groups)

1 MARCH 2016
2.30 p.m. - 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **TWO (2)** printed pages excluding the cover page.
2. Answer all **FOUR (4)** questions.
3. Write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.
4. **ONLY** non-programmable calculator is allowed to be used for this exam.

Question 1 (18 Marks)

(a) Evaluate the following limits.

(i) $\lim_{t \rightarrow 0} \left(\frac{\sqrt{t+4} - 2}{t} \right)$

[6 marks]

(ii) $\lim_{x \rightarrow +\infty} \left(\frac{2x^3 + 4}{x + 2} \right)$

[6 marks]

(b) For what value of c is

$$f(x) = \begin{cases} x^2 - 1, & x < 3 \\ 2cx, & x \geq 3 \end{cases} \text{ continuous at every point of } x?$$

[6 marks]

Question 2 (32 Marks)

(a) Differentiate the following function using the definition of the derivatives.

$$f(x) = \frac{1}{x}$$

[10 marks]

(b) Find the derivatives of the following functions using the appropriate rules.

(i) $y = x^2 \sin x + 2x \cos x - 2 \sin x$

[7 marks]

(ii) $f(x) = (3x - x^3 + 1)^4$

[4 marks]

(c) Find y' given $xy = y^2 + 1$

[5 marks]

(d) Find all the critical values of the given function.

$$y = 2x^3 - 2x^2 - 2x$$

[6 marks]

Continued...

Question 3 (32 Marks)

(a) Evaluate the following integrals.

(i) $\int_0^1 z^3 (3z^4 + 1)^3 dz$

[9 marks]

(ii) $\int (4x^2 + 5x + 3) dx$

[3 marks]

(b) Sketch the graph and find the area of the region that completely enclosed by the graphs of the given functions $f(x)$ and $g(x)$.

$$f(x) = x^2 - 2x$$

$$g(x) = x$$

[14 marks]

(c) Find the volume of the solid formed when the area bounded by the curves $y = x^2$ and $y = \sqrt{x}$ is rotated about the x -axis at $x = 0$ and $x = 1$.

[6 marks]

Question 4 (18 Marks)

Solve the following differential equations.

(a) $\frac{dy}{dx} = \frac{x^3}{y^4}$

[5 marks]

(b) $(2y^3 + 1)x^4 \frac{dy}{dx} = x^3 + 4$

[6 marks]

(c) $3 \frac{d^2 y}{dx^2} = 5 \frac{dy}{dx} - 2y$

[7 marks]

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